

Nebraska Geological Column

GeoPhysical Science



Niobrara State Park

Starr Pit, Dakota Sandstone Formation



**Dakota Sandstone formation
found in Starr Pitt near
Fairbury, NE**



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
M E S O Z O I C	C r e t a c e o u s	L O W E R	Dakota Sandstone in early Albian	River/Ocean estuary	Warm, possibly sub-tropical. Plant debris found around edges of site.	Definite cross-bedding is evident in sandstone. Water flow was to the west, right to left in picture. There is evidence of tidal influence in above layers of siltstone with heterolithic deposition evident. Each alternating layer of sandstone and siltstone suggests channel shifting. The size of sand sediments was fine to medium.

Rose Creek Road Cut, 7 miles S. of Fairbury, NE



Dakota Sandstone Formation at Rose Creek Road Cut



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
M E S O Z O I C	C r e t a c e o u s	L O W E R	Dakota Sandstone in early Albian	River channel, flood plain	Warm, possibly sub-tropical.	Definite cross-bedding is evident in sandstone. Water flow was to the southwest, left to right in picture. Iron concretions are present in and around the sandstone. The unlithified mudstone is mottled clay with red, yellow, and gray coloring. This is a paleosol with siderite deposits. There are also numerous selenite crystals on the surface of the paleosol.

Graneros Shale Formation along Hwy 15 in S. NE



Ash layer at the top of the Graneros Shale Formation



Contact point with Dakota sandstone



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
M E S O Z O I C	C r e t a c e o u s	U P P E R	Graneros Shale Formation in Cenomanian	possible flood plain	Warm, possibly sub-tropical.	<p>There was an ash layer called bentonite at the top of the formation from a volcanic eruption in Utah.</p> <p>This is a marker layer because the ash can be dated. Also at the very left of the picture there was a contact point between the Dakota sandstone and the Graneros shale.</p>

Greenhorn Limestone Formation in N. Kansas on Hwy 36



Remains of clam fossil in Lincoln Limestone member



Small ash layer in the Lincoln Limestone member

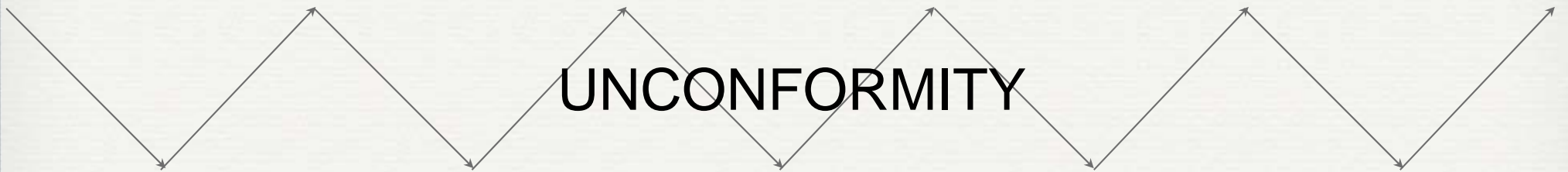


Example of mold and cast fossil in Bridge Creek member



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
M E S O Z O I C	C r e t a c e o u s	U P P E R	Greenhorn formation starting in late cenomanian	Definite marine environment, up to 200 m deep	Warm, possibly tropical	<p>There were three members of the Greenhorn formation in this road cut. First was the Lincoln limestone member. It was mixed with shale so it appeared black, but definite effervescence with HCL. There were at least 4 thin ash layers visible. Next was the Heartland Shale member. This layer had signs of a global OAE which indicated the boundary between the cenomanian and teronian. The top layer was the Bridge Creek limestone member. It was rich with inoceranids (clams). Beware of scorpions at this place!</p>

Greenhorn Formation



Niobrara Formation

Niobrara Formation in N. Kansas on Hwy 36



Large Horseshoe clam fossil viewed from the top

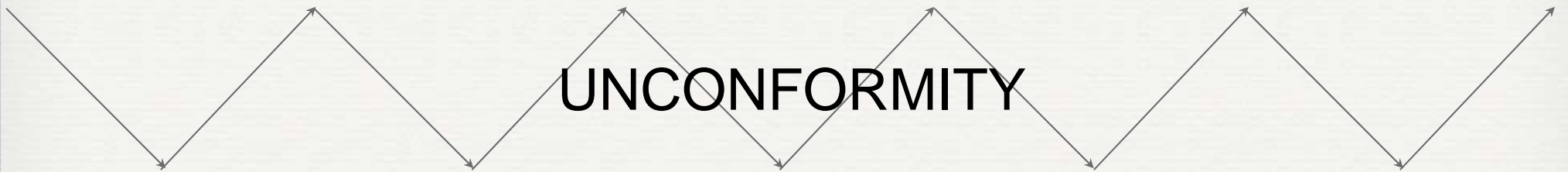


Large Horseshoe clam viewed from a cross-section



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
M E S O Z O I C	C r e t a c e o u s	U P P E R	Niobrara Formation, Fort Hayes Chalk member	Definite marine environment	Warm, possibly tropical	This chalk limestone is rich with inoceranids, bacculities, and ammonites. Also, large horseshoe clams (<i>Volviceramus grandis</i>) were visible on the flat surfaces and the cliff walls. Bioturbation is also visible in the chalk.

Niobrara Formation



Pierre Formation

Pierre Shale Formation near Niobrara State Park



Slump mass wasting exposing Crow Creek member



Close up showing contact point between limestone and shale



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
M E S O Z O I C	C r e t a c e o u s	U P P E R	Pierre Shale Formation	Definite marine environment with large plesiosaur fossils recovered	Warm, possibly tropical	<p>Pierre Shale formation at Niobrara State Park along Hwy 12 in Nebraska. Youngest cretaceous rocks. Oxidation of iron sulfides into sulfates evident. Selenite crystals readily available. Inside the park was large slump exposing unique Crow Creek member of Pierre Shale formation. It is unlithified limestone that was deposited from a tsunami caused by the Manson meteorite impact in Iowa. The limestone shows graded bedding.</p>

Pierre Formation



UNCONFORMITY

Ogallala Group

Ashfall Fossil Beds in NE showing parts of Ogallala group



Complete Rhino skeleton in ash layer inside the barn



Top-Rhino rib bone, Bottom-part of giant tortoise shell



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
C E N O Z O I C	N e o g e n e	M I O C E N E	Parts of Ogallala group, Valentine Formation, Ash Falls Formation, and Long Pine Formation	Terrestrial	Cool and dry with grasses starting	Evidence of three members of Ogallala group at Ashfalls fossil beds. Bottom layer is Valentine sandstone formation followed by Ash Hollow unstratified sandstone formation. Both show deposition from floodplain. Top layer is the Long Pine formation with stream deposition. Ash deposits from Bruneau-Jarbridge crater, super volcano in SW Idaho covered NE with 12" of ash, however at Ashfalls there was a watering hole that filled in with up to 6' of ash from blizzard-like winds blowing the ash around.

Peoria Loess Deposits along Hwy 281 in NE



Close up of Loess deposit showing snail shells



Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments
C E N O Z O I C	Q u a t e r n a r y	H O L O C E N E	Peoria Loess deposits	Terrestrial	Cool, dry and windy.	Coming off of glaciation and sandhill movement, winds pick up fine sediment and blow loess deposits further East in Nebraska. This Peoria Loess deposit on HWY 281 in NE near mile marker 100 was aprox. 4 meters thick. There were evident snail shell pieces and whole parts visible in the loess deposits. Sediment size is very fine like silt.

References

Era	Period	Epoch	Rock Unit	Depositional Environment	Climate	Description/Comments